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## Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics

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### ABSTRACT

The “flipped classroom” has begun to revolutionize the way that students receive information from their teachers and is ushering in a new era of active and creative thinkers. Although flipping the classroom has gained popular attention, very little research has focused on flipping the classroom at the collegiate level. This paper documents the implementation of a “partially-flipped” class over one semester of a large enrollment microeconomics course, as well as presents results of students’ perception toward flipped learning. I find that students respond positively to flipped learning, and that it is an instructional design that is beneficial across student groups.

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## 1. “Flipping” the classroom

In order to motivate the entirety of this paper consider one of the first lessons learned in an economics course, the production possibilities frontier. Within a class period there are many ways in which time can be allocated between lecturing and using active-learning exercises, but we are bounded by the amount of time available. Thus, let’s consider a “teaching PPF” in which there are two

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choices the teacher has – lecturing and using active-learning activities. Some teachers choose to allocate their time mostly toward lecture, others toward activities and discussion, but in each case there is an opportunity cost of switching between the methods of teaching. Now, usually within the same class period that the PPF is introduced instructors discuss the role technology plays in shifting the PPF outwards from the origin. Technology can play as important of a role in this simple illustration as it does in any other example. By utilizing technology in an appropriate way, it is entirely possible to shift the teaching PPF outwards from the origin. The aim of this paper is to show one way in which the teaching PPF can be shifted outwards through the use of flipped learning.

A flipped classroom is named as such because the learning process is “flipped” from its traditional scheme. Instead of spending entire periods watching a lecture, students watch lectures online outside of class time and use class time to do activities. The notion of flipping the classroom, and its popularity, can largely be attributed to Salman Kahn, founder of the *Kahn Academy* which is a free online system that has videos covering a multitude of topics and subjects, including economics. Since the launch of the Kahn Academy, flipped learning has received quite a wide spectrum of attention ranging from news articles in *The Economist* ([Economist, 2011](#)) to an entire new branch of the TED organization, TEDEd. Too, flipped learning has been a hot topic on “less academic” media such as blog posts. While there has been a fair amount of fervor surrounding the concept, flipped learning must still be researched to gauge student perceptions of learning, as well as actual efficacy. This paper is a first attempt at motivating the further use and research of flipped-learning within the economics classroom, though previous research on the use of lecture videos in teaching economics is widely applicable to the present paper. In the early stages of development and wider scale adoption of flipped learning as a pedagogical tool it is very important to gather student reactions and feedback. To that end, this paper gauges students’ beliefs and attitudes toward flipped learning by using a ten question Likert-type inventory, as well as responses to open-ended questions taken at mid-semester. Although this paper discusses flipped learning in the context of an economics classroom, this research is useful to the education literature at large because research on flipped learning has been left mostly to news media and the “blogger.” The rest of the paper continues accordingly: Section 2 describes the potential benefits and pitfalls of flipped learning; Section 3 discusses the instructional design used in this course specifically, and also describes some of the active and collaborative learning techniques that were used; Section 4 presents data on how students have responded to flipped learning; Section 5 concludes.

## 2. Why flip the classroom?

The flipped paradigm is one that comprises many potential benefits including: more one on one time with students, opportunities for active and collaborative learning, missed lectures, self-paced learning, and “just-in-time” type instruction. Indeed, flipped learning can be considered more of a complement, rather than a substitute, to the traditional collegiate classroom because it allows classroom time to be geared more toward active and collaborative learning. [Lage et al. \(2000\)](#) were among the first researchers to discuss the benefits that could accrue when “inverting” the economics classroom. It is surprising, though, that flipped learning has not taken hold in the economics profession since their article was published given the wide-spread availability of technology in creating video lecture materials. Too, the astounding growth of YouTube as a learning tool has certainly lowered the barriers to entry in adapting this pedagogical practice. From an educational efficacy perspective, [Chen and Line \(2012\)](#) show that using videos of lecture material in a microeconomics class leads to an average increase of 4 percentage points. [Flores and Savage \(2007\)](#) show that not only does the use of recorded lecture material aid in student performance, students are willing to pay more for a class that makes use of recorded lectures. Pioneers in flipped learning, [Bergmann et al. \(2012\)](#), note that flipped learning is not “a synonym for online videos. When most people hear about the flipped class all they think about are the videos. It is the interaction and the meaningful learning activities that occur during the face-to-face time that is most important”. As most economics educators are well aware, most authors cite similar “meaningful” and deep-learning aspects when discussing active and collaborative techniques. For this reason the time spent in class will be at the core of the discussion on flipped learning in what follows.

The benefits that can accrue from active and collaborative learning are well documented within the education literature, and thus will only be discussed briefly.<sup>1</sup> McGoldrick et al. (2010, 65) write that including carefully constructed collaborative learning in the economics classroom can appeal to a wide range of students and perhaps help to, “increase diversity in the economics major”. Empirical research on active and collaborative learning in economics has found that students who were taught with collaborative learning techniques performed better, as measured by test grades, than a control group of non-collaborative teaching (Yamarik, 2007). Maxwell et al. (2005) arrives at a similar result, though the authors note that the efficacy of collaborative methods may depend on the teacher’s ability to implement this teaching strategy. Despite the many reasons to incorporate active and collaborative learning, a median of only 30% of class-time is being devoted classroom activities and discussion in economics (Goffe and Kauper, 2013). The common reasons that active and collaborative learning techniques are not used in the college classroom include large class sizes, “course thinning” – less material is able to be covered, and preparation time. In fact, in a survey of economics principles instructors Goffe and Kauper (2013) find that the predominant reason why lecture is preferred to lecture-alternatives are preparation and time costs, with 16% of instructors mentioning time constraints as the hindrance. Flipped learning, as it was used in this study, remedies the problem of course thinning because it effectively adds an extra class period per week that can be devoted to active learning; if you recall the PPF example discussed previously you can see the applicability. Concerning the use of interactive methods, Hoyt et al. (2010, 220) note that, “While large class size does increase the likelihood of barriers related to student passivity and anonymity, with effective classroom management, careful planning, and ingenuity, teaching a large enrollment course can actually turn out to be a very engaging and productive learning experience for students and a rewarding experience for the instructor”. The authors also discuss methods that can be used in large enrollment course, one of which was used during this semester will be discussed below. With full disclosure, flipped learning does require a fair amount of preparatory work on the front end, which could be as much of a hindrance as Goffe and Kauper’s finding that instructors choose to primarily lecture because of the amount of preparation necessary.

A potential benefit of flipped learning is that students are able to cover course material at a pace that conforms to their learning style. Self-paced learning has been widely studied in the education literature, as well as the literature regarding online classes. Tullis and Benjamin (2011) find that self-paced learners fare better when their study time is allocated to more difficult tasks. In a fully online class, guiding self-paced learners to spend more time on higher-level learning tasks may prove to be difficult. Too, Sansone et al. (2011) find that students are driven by two different stimuli: “goals-defined” – the value of what is being learned, and “experience-defined” – how interesting the topic is. These attributes are significant in determining a student’s self-motivation for learning while taking an online course. Thus, truly self-paced learning may not be as beneficial as when an instructor is able to scaffold the learning environment by answering and directing student questions. The problems of ability and motivation while learning online is mitigated, though, in the context of a flipped classroom because the instructor is able to speak with students in the classroom, and can intervene if a student is having difficulties applying the techniques or topics covered. Moreover, an instructor is able to appeal to both the students’ “goals-defined” and “experience-defined” needs by explicitly showing or stating learning objectives in class during applications of the material learned online.

The notion of “just-in-time” instruction, helping a student at the moment of confusion by using pre-instruction quizzes or assessment, is a natural application of one-on-one teaching that is possible when students are working on practice problems or group worksheets during class time (Novak et al., 1999; Formica et al., 2010). Another benefit to flipping the classroom that Bergmann et al. (2012) note is the ability to help students to catch up on missed materials. While a student may miss the application and higher levels of learning that may be achieved during class time, students are still able to catch up on material by watching the week’s lecture online at their leisure.

Because this study is geared more toward student reactions to flipped learning, and not the effect of increased active learning in the economics classroom, actual benefits to student learning as measured

<sup>1</sup> I recommend the interested reader to an excellent, research based introduction to interactive and collaborative learning – Linda Nilson’s “Teaching at its Best” cited in the reference section.

by test scores (or any other method) are not estimated here. A few quick “back of the envelope” type analyses are interesting to note, though. During the flipped semester, students performed slightly better on average on midterm tests compared to previous semesters taught by the same instructor even though the tests were more difficult by the standards set forth by the Association to Advance Collegiate Schools of Business (AACSB). Furthermore, using a quick differences-in-differences regression students enrolled in the semester in which the classroom was partially flipped performed better on a common final exam relative to the non-treatment group of students enrolled in a previous semester when the flipped model was not used, and relative to a control group of other sections not taught by the same instructor or using the flipped paradigm. These results should be taken warily, though, because there is concern over omitted variables because no other information was available to use as independent variables in determining a student’s final exam (e.g. attendance, age, etc.).<sup>2</sup>

From an institutional perspective it is natural to ask how flipped learning can help in terms of cost effectiveness. Since the onset of the most recent recession many universities have had the fortunate problem of increased enrollment. Indeed, burgeoning enrollment may be a partial explanation for the recent increase in online and hybrid courses offered across the United States. Flipped learning as it is advocated here, though, does not necessarily allow for physical classroom space to be spread across a greater amount of classes as online or hybrid classes offer. Instead, what flipped learning offers is a closer relationship between teacher and student during class time; a result that is normally only achieved with low student to teacher ratios. Kahn (2011) calls the increased interaction between instructor and student “humanizing the lecture” and advocates considering “student to valuable-human-time” ratios instead of actual student to teacher ratios. If flipped learning is used to allow more time for personalized instruction, then perhaps higher student to teacher ratios can be tolerated. Returning to the question of cost effectiveness when using flipped learning, it may in fact be cost effective to utilize flipped learning because more students can be added to the classroom without sacrificing the “student to valuable-human-time” that is traditionally only gained with low student to teacher ratios.

The benefits from flipped learning are not without potential drawbacks which may include limited access to internet connection and technology, or increased reliance on lecturing in the videos as opposed to a more Socratic lecturing style, than would happen in a normal classroom. On a traditional college campus the worry of access to technology may be mitigated by resources in the library and other campus centers. On smaller college campuses or campuses that are designed to accommodate non-traditional or commuter students the worry may remain. Increased use of lecture, while not necessarily a negative feature, may be a worry to teachers who typically use a more Socratic or interactive teaching style. There is no single answer to the appropriate mix of lecture-based or application-based video recordings as it likely depends on the course that is being taught. For instance, the videos used in this study were a mix of lecture-based and application-based, but while introducing students to MATLAB a more lecture-based approach was used in Talbert (2011).

### 3. Instructional design

In this study, flipped learning was implemented in a single principles of microeconomics course at the beginning of the semester. Upon enrollment students did not know that a non-traditional method would be used, and thus the course did not necessarily attract learning styles that are more inclined to online learning. The flipped paradigm was introduced to students at the beginning of the semester, and students were told that they would need to watch one video per week that was available on a blog that was prepared by the author.<sup>3</sup> The students were also told that the video must be watched by the corresponding Friday, and that any material covered in the video could be included on quizzes and tests. The blog was updated each weekend to include the video for the week, and all previous videos were left online for the students to be able to retrieve and re-watch. On a typical Monday or

<sup>2</sup> The  $R^2$  of this regression is very low at .08, though the difference-in-differences estimate of 3.52 points is statistically significant at the 5% level.

<sup>3</sup> All flipped lessons are available for viewing online at <http://www.travisroach.com/blog>.

**Table 1**

List of video-lectures.

Lesson name	Video	Source	Lesson	Active learning techniques
Hard knock life	Do knock-offs prove the value of a brand?	PBS: Idea Channel	Product differentiation, features of perfect competition	PBL – practice problems
Black market economics	The anti-addiction pill that's big business for drug dealers (podcast)	NPR: Planet Money	Regulation, compensating wage differentials, Borda count	Small-group discussion of a policy proposal, PBL, Borda count to select most favored policy
Immigration reform	Immigration reform	Wall Street Journal: Opinion Journal	Cross-price elasticity in input markets	Small-group discussion and debate, case-studies
Price-elasticity of demand	Price-elasticity of demand	Kahn Academy	Calculating elasticities along a linear demand curve	PBL – worksheets relating price-elasticity of demand with total revenue
The monkey economy	The monkey economy	Freakonomics	Law of demand, compliments and substitutes	Discussion, practice problems
Circular flow model	Circular flow model	Kahn Academy	The circular flow of economic activity	Individual and group time to extend the basic model and include government
Abortions and the post hoc fallacy	Correlation vs. causality: freakonomics movie	Freakonomics	Distinguishing between causation and correlation	Small-group and full class discussion

Wednesday the students came to class and participated “as normal” in that course material was covered in a lecture style format. The students did participate in various active learning activities on these days, but not to the extent that they were required on Fridays. On Fridays, the class was solely devoted to the application of the material that had been learned in the video and in the lectures of the week through various active learning exercises (see below in Table 1). Hence, this was a “partially-flipped” class that I referred to as my “Friday Flip.” Although the class was held in a large auditorium-style environment, on the flipped Fridays the class was typically broken up into groups and scattered throughout the hall working on problems and activities.

The greatest boon to me as an instructor in using the flipped format was the ability to use class time in a more hands-on manner that the students appreciated, while having the students engaged with the material being taught instead of passively listening and note-taking. As one example, consider the time that is necessary to teach the circular flow model. Now, consider being able to use that time to instead have the students actually *apply* the model and consider deeper questions of leakages in the economy or interactions between the government and the various markets without yielding valuable time that is necessary for teaching other topics. Moreover, learning experiences like these allow the students to have an additional tactile memory of speaking, discussing, and solving problems with their classmates instead of the basic learn-and-recall that happens when students have only note taking as their memory of learning the material.

Admittedly, this same type of learning environment is attainable if students come to class having carefully *read* the material previously instead of watching it delivered in video format. Flipped learning, then, can be thought of as engaging students in learning the material outside of class in a manner that is more attuned to their media habits. Thus, the flipped learning model can also be thought of as a way of enhancing student preparedness, which in turn allows for more efficient use of in-class time.

For the most part, all flipped lessons were created using the online software at <http://ed.ted.com>. This software is very malleable in that any video that is currently listed on YouTube or in the TED Talks directory can be used and questions can easily be created to follow along with the video. Within the TEDEd software, there are options to allow for open-ended or multiple choice questions that students can answer and receive feedback on. Also, the instructor is able to add supplementary

commentary and links after the video to help students find additional information. In general, each video used in this study was accompanied by both open-ended and multiple choice questions of which the open-ended questions were often the stimulus for discussion that week.

Because this was a pilot study on student perceptions toward flipped learning the author opted to use a variety of videos. Some videos were “lecture-type” in that students watched and took notes (for instance videos by the Kahn Academy), while others were less like a traditional lecture and included applications of economic problems. Although using a mix of videos was primarily intended to distinguish between which video type should solely be used in future semesters, students responded to an informal questionnaire that they appreciated having a mix of video types. One student even went as far as to note that they “think a lot of learning styles could really ‘get it.’” Table 1, below, lists the videos that were used, the goal of the lessons taught, and the active learning techniques used in class. Many of the active and collaborative learning techniques used throughout the class; including: think-pair-share, small-group discussion, problem based learning, and case-studies; are discussed in detail in greater detail than here in Nilson (2010), and are discussed for economics in particular in Salemi and Walstad (2010). Too, the Starting Point: Teaching and Learning Economics<sup>4</sup> website that was developed with funding from the National Science Foundation is an excellent resource of active and cooperative learning examples and techniques.

- *Think-Pair-Share*: This is a superb, and easy, activity to implement in a large classroom so that students actively engage the material through discussion. The instructor simply poses a question to the class and allows a few moments for students to *think* about an answer. Students then *pair* off with classmates to discuss their thoughts on the question that has been asked. Finally, students are then asked to *share* their thoughts aloud with the class. This activity is also nice for a large class because students that are more timid can still benefit from discussion without the pressure of speaking in front of a large audience.
- *Small Group Discussion*: Discussion in small groups is a very natural extension from think-pair-share and can be combined effectively. Groups can be given a list of topics and talking points, or they can come up with their own as an extra active-learning assignment; talking points are helpful in keeping conversation flowing and on topic. The added benefit to the instructor in this setting is the ability to walk amongst groups and gauge how well the students are covering the material.
- *Problem Based Learning (PBL)*: There is a very large literature on problem based learning; especially in the science, technology, engineering, and mathematics (STEM) disciplines. The cognitive benefits from using PBL are vast and include: flexible learning skills, life-long learning skills, effective problem-solving skills, becoming an effective collaborator, and becoming intrinsically motivated to learn (Hmelo-Silver, 2004). PBL offers a variety of options to the instructor, and the assignments can be varied from clicker multiple choice questions, to in class problems and worksheets. Too, students can respond to news articles or videos by developing policy proposals and presenting them to the entire class.
- *Case-Studies*: This activity is very closely related to PBL. With this activity the instructor gives students a real-world account and asks the students to respond to it by answering questions, discussing amongst groups, or comparing the case to the topic of the video-lecture. This activity is easily linked to any of the previously discussed activities.

#### 4. Student perceptions

In order to gauge students’ perceptions toward flipped learning, students were surveyed twice. The first survey was distributed at mid-semester to collect qualitative data in order to help refine the method and delivery of the video-lectures. This survey asked simple questions like: What works well? What helps you learn? What does not work well? What changes would you suggest?

In response to “What works well?” many students mentioned the ability to watch the videos on their own time, and being able to pause and rewind the video when they became confused. One student mentioned that, “it really helped me to pause the price-elasticity video and do the calculation

<sup>4</sup> <http://serc.carleton.edu/econ/index.html>.

**Table 2**

Likert-type survey.

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<i>Demographic questions</i>
(1) What is your gender?
(2) Which college are you currently associated with?
(3) At the beginning of the Spring 2013 semester in what range did your GPA fall?
(4) What is your expected grade in this course?
<i>Survey questions</i>
(1) I would take another course that used the video lectures alongside traditional classroom learning.
(2) The video lectures were easy to access.
(3) The video lectures helped me learn.
(4) Discussing with classmates helps me learn.
(5) Compared to other courses I've taken this course is interactive.
(6) The ability to rewind the video lecture helps me learn.
(7) Knowledge about economics from other sources helps my understanding.
(8) I usually watch the video lecture for the week.
(9) Video lectures that resemble in-class lectures help me learn.
(10) The course as a whole was a valuable learning experience.

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before he did." Another mentioned that it was nice to "watch the video again real quick while walking to class." As an instructor, it was beneficial to have students who had a previous exposure to the material beyond a cursory reading of the textbook.

In response to "What does not work well?" some students mentioned that they did not like the video lectures that more closely resembled actual lectures. Specifically, one student wrote that, "the video-lecture that is just notes is helpful, but it's [kind of] boring." Others intimated similar feelings, but most noted that it helped them during the application of the lesson. Many students also used this question to motivate their response to "What changes would you suggest?" Somewhat surprisingly, many students suggested having more videos per week. Others mentioned that it would be nice to have a forum to discuss the videos while online. The most mixed responses came in terms of suggesting future videos. Almost as many students suggested using more videos that resemble in-class lectures as those that requested more videos that were an application of an economic concept.

The second survey consisted of basic demographic questions and a 10 question inventory<sup>5</sup> using a Likert-type scale, i.e. students responded by stating that they strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree to each prompt. This survey was taken online using Qualtrics software, and was completely anonymous. A total of 96 students responded to the survey (54% of the class completed the survey). Given the responses to the diagnostic questions (GPA, etc.) there was not a tendency for only high-achieving students to respond to the survey. The questions that were asked are included in Table 2 below. The survey was designed with the intention of collecting responses to four different categories. First, what was the overall impression that students have about flipped learning (questions 1, 3, 10)? Second, were students actually watching the video-lectures (2, 8)? Third, what was the perceived level of interaction (4, 5)? Fourth, how did the students react to the method and types of video-lectures (6, 7, 9)?

Overall, the flipped classroom format was well-received by students. In response to item 1, "I would take another course that used video lectures alongside traditional classroom learning" 76% of students responded with either strongly agree or agree. Similarly, 76% of students responded positively to item 3, "The video-lectures helped me learn."

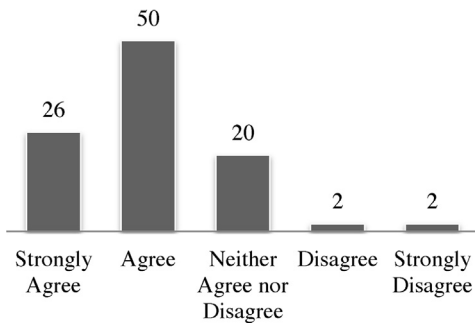
According to the responses for the second category of questions, the majority of students were in fact watching the video-lectures. While there may be some self-reporting bias in the data, the nature of the questionnaire lends itself toward honesty. The most variation in student responses is found for the third category of questions that gauged student perceptions of interaction. In response to question 5, "Compared to other courses I've taken this course is interactive," 94% of students responded with

<sup>5</sup> I am thankful for help from my colleagues at the Teaching, Learning, and Professional Development Center in developing and refining this survey. Some questions were developed following examples from House et al. (2007) and Wyk (2012). Moryl (2013) uses a similar instrument in assessing the effectiveness of podcasts in an introductory microeconomics course.

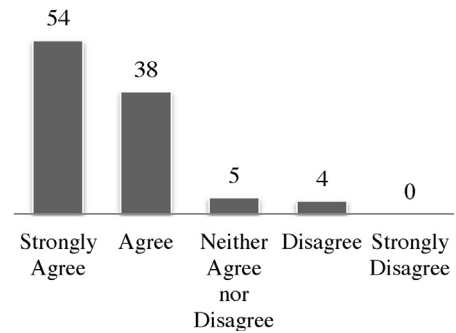
either strongly agree or agree. In response to question 4, however, only 62% of students agreed that discussing with classmates helps them to learn. This finding is somewhat in line with the observation of [Strayer \(2007\)](#) that students felt an “unsettledness” with the variety of learning activities in a flipped classroom environment. As an instructor it is beneficial to note that students certainly agreed that this classroom design was very interactive in relation to other courses they have taken, but that students may be weary of the learning method because the onus of learning has been shifted to them.

**Table 3**  
Responses to Likert-type Inventory.

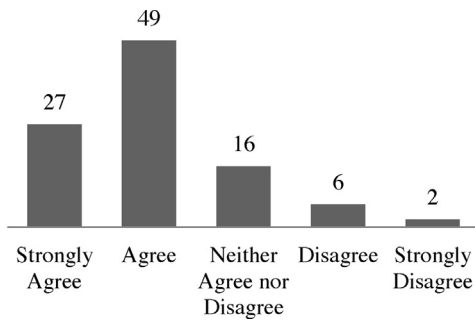
(1) I would take another course that used video lectures alongside traditional classroom learning.



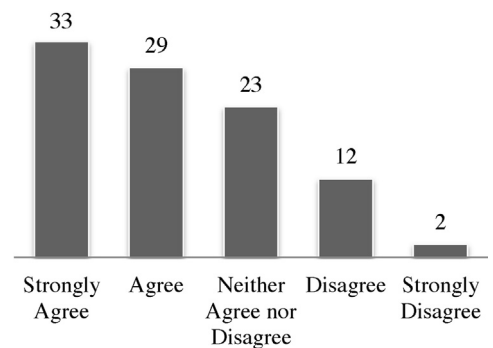
(2) The video lectures were easy to access.



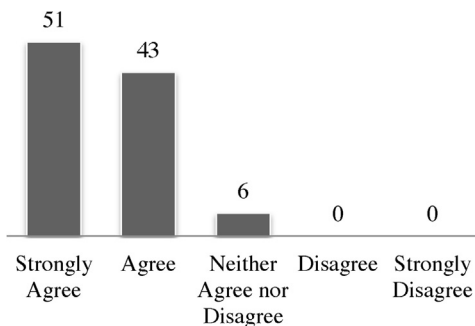
(3) The video lectures helped me learn.



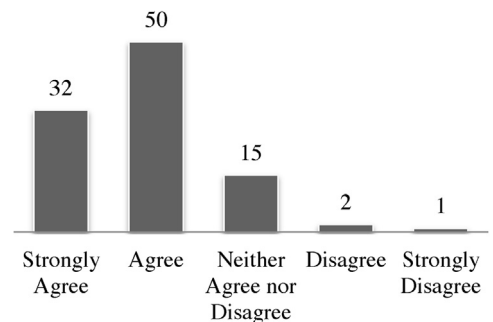
(4) Discussing with classmates helps me learn.



(5) Compared to other courses I've taken this course is interactive.



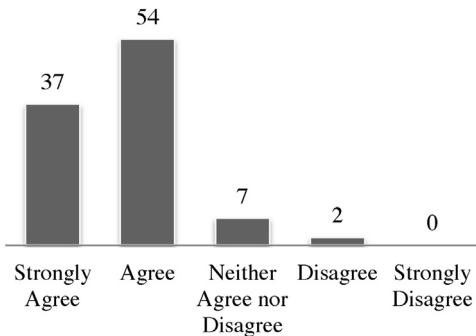
(6) The ability to rewind the video lecture helps me learn



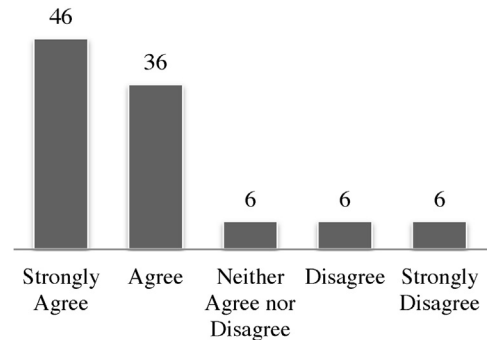


**Table 3** (Continued)

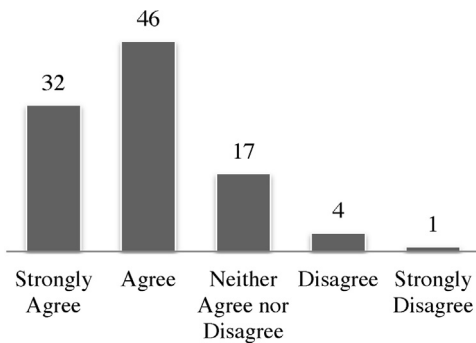
(7) Knowledge about economics from other sources helps my understanding.



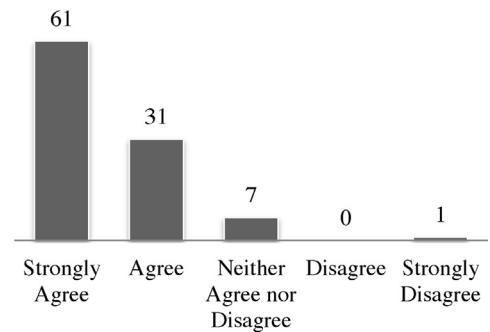
(8) I usually watch the video-lecture for the week.



(9) Video-lectures that resemble in-class lectures help me learn.



(10) The course as a whole was a valuable learning experience.



Note: Numbers above bars represent percent responding.

Following the previously cited findings that active and collaborative learning during face-to-face instruction is beneficial to student cognition and retention, these findings suggest that flipped learning is helpful in engaging students more than is happening in their other classrooms, but that a variety of activities should be used. Furthermore, the presence or scaffolding by the instructor in large or small group discussion may help ease the concern of students that they are not gaining by discussing with their classmates.

Finally, the fourth category of questions, which was intended to capture what types of videos the students preferred, received results that were according to expectations. When asked whether or not the ability to rewind the videos helped their learning, 82% of the students responded positively. This finding adds more evidence that self-paced learning can be a boon to educational development. In response to question 7, “Knowledge about economics from other sources helps me learn,” students responded quite positively with 91% in agreement. In contrast, though, only 78% of students agreed with question 9, “video-lectures that resemble in-class lectures help me learn.” Thus, a mix of videos may be preferable to simply selecting one method of delivering information online. While there was a large drop-off in agreement when students were asked specifically about the Kahn academy videos, many students still indicated that they helped them learn (Table 3).

The standard Pearson chi-squared statistic with the Rao and Scott (1981, 1984) correction for Likert-type data is used to test for differences among demographic groups to the survey. This test examines, for instance, if females tend to rate flipped learning higher than males, or if older students differ in their responses compared to younger students. For the most part I do not find evidence that

demographic groups responded to the questionnaire differently. This finding holds when bootstrapped standard errors and Jackknife methods are used, so sample size is not of concern. In fact, the only borderline statistically significant result was that students that had higher previous GPAs tended to respond with either strongly agree or agree to the question of whether or not discussing with classmates helped them to learn ( $p$ -value of .07).

It may seem odd to accept the lack of statistical significance as a good finding, but for the current study this is very helpful. This finding implies that the flipped learning model is beneficial across student groups, and does not help or hinder any one set of students. Further, following the intuition in [McGoldrick et al. \(2010\)](#) using flipped learning to increase active learning during face-to-face time may in fact help to diversify the economics major since females did not evaluate their learning experience any lower. Note that inferences based on whether or not different majors opposed flipped learning could not be made because the vast majority of students enrolled in the class and completing the survey were business students, and there is not enough data on non-business majors to make careful observations.

## 5. Conclusion

This paper has shown how students responded to flipped learning in a large enrollment principles of microeconomics course over one semester. In general, students responded quite positively to flipped learning with 76% of students responding that flipped learning helped them learn. Too, 94% of students responded that this class was more interactive than other courses they had taken. For those that believe active and collaborative learning is a boon to educational development this is a very promising result. A key finding, albeit anecdotal, was that by implementing a flipped design more time can be allocated to active-learning techniques without the worry of losing time covering essential course material. Further, by engaging students with a media-type that they may appreciate more than the standard textbook it is entirely possible that course material is covered more quickly because the students have a better understanding of the material before coming to class, and thus deeper learning can occur in a short time period.

Admittedly, much more research is necessary to fully accept flipped learning as a widespread pedagogical practice. This paper has shown responses from students over one semester in a specific discipline, but more work must be done to test the efficacy of flipped learning in a collegiate environment. Specifically, quantifying the gains from flipped learning in terms of increased test scores would be beneficial to both the economics profession as well as the wider academic community.

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## References

- Bergmann, J., Overmyer, J., Willie, B., 2012. The Flipped Class: What It Is and What It Is Not, <http://www.thedailyriff.com/articles/the-flipped-class-conversation-689.php> (accessed 10.12.12).
- Chen, J., Line, T.-F., 2012. Do supplemental online recorded lectures help students learn microeconomics? *Int. Rev. Econ. Educ.* 11 (1.) .
- Economist, 2011. Flipping the Classroom: Hopes That the Internet Can Improve Teaching May At Last Be Bearing Fruit. *The Economist*, Sept. 17, <http://www.economist.com/node/21529062> (accessed 12.03.13).
- Flores, N., Savage, S.J., 2007. Student demand for streaming lecture video: empirical evidence from undergraduate economics classes. *Int. Rev. Econ. Educ.* 6 (2.) .
- Formica, S.P., Easley, J.L., Spraker, M.C., 2010. Transforming common-sense beliefs into Newtonian thinking through just-in-time teaching. *Phys. Rev. Special Top. – Phys. Educ. Res.* 6, 1–7.
- Goffe, W.L., Kauper, D., 2013 May. A Survey of Principles Instructors: Why Lecture Prevails Working paper.
- Hoyt, G., Kassis, M., Vera, D., Imazeki, J., 2010. Making cooperative learning effective for economics. In: *Walstad, W.B., Salemi, M.K. (Eds.), Teaching Innovations in Economics: Strategies and Applications for Interactive Instruction*. Edward Elgar, Cheltenham, UK/Northampton, MA, pp. 65–94.

- Hmelo-Silver, C.E., 2004. Problem-based learning: what and how do students learn? *Educ. Psychol. Rev.* 16 (3), 235–266.
- House, L., Weldon, R., Wysocki, A., 2007. Student perceptions of online distance education in undergraduate agricultural economic programs. *J. Agric. Appl. Econ.* 39, 275–284.
- Kahn, S., 2011. Salman Khan talk at TED 2011 (from ted.com) . <http://www.youtube.com/watch?v=gM95HHI4gLk> (YouTube video, 20:27, posted by "khanacademy", 09.03.11).
- Lage, M.J., Platt, G.J., Treglia, M., 2000. Inverting the classroom: a gateway to creating an inclusive learning environment. *J. Econ. Educ.* 31 (1.), 30–43.
- Maxwell, N.L., Mergendoller, J.R., Bellisimo, Y., 2005. Problem-based learning and high school macroeconomics: a comparative study of instructional methods. *J. Econ. Educ.* 36 (4), 315–329.
- McGoldrick, K.M., Rebelein, R., Rhoads, J.K., Stockly, S., 2010. Making cooperative learning effective for economics. In: Walstad, W.B., Salemi, M.K. (Eds.), *Teaching Innovations in Economics: Strategies and Applications for Interactive Instruction*. Edward Elgar, Cheltenham, UK/Northampton, MA, pp. 65–94.
- Moryl, R., 2013. T-shirts, moonshine and autopsies: using podcasts to engage undergraduate microeconomics students. *Int. Rev. Econ. Educ.* 13, 67–74.
- Nilson, L.B., 2010. *Teaching at its Best: A Research-based Resource for College Instructors*. John Wiley & Sons, San Francisco, CA.
- Novak, G.N., Patterson, E.T., Gavrin, A., Christian, W., 1999. *Just-in-Time Teaching: Blending Active Learning and Web Technology*. Prentice Hall, Saddle River, NJ.
- Rao, J.N.K., Scott, A.J., 1981. The analysis of categorical data from complex sample surveys: chi-squared tests for goodness of fit and independence in two-way tables. *J. Am. Stat. Assoc.* 76, 221–230.
- Rao, J.N.K., Scott, A.J., 1984. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Ann. Stat.* 12, 46–60.
- Salemi, M.K., Walstad, W.B. (Eds.), 2010. *Teaching Innovations in Economics: Strategies and Applications for Interactive Instruction*. Edward Elgar, Cheltenham, UK/Northampton, MA.
- Sansone, C., Fraughton, T., Zachary, J.L., Butner, J., Heiner, C., 2011. Self-regulation of motivation when learning online: the importance of who, why and how. *Educ. Technol. Res. Dev.* 59, 199–212.
- Strayer, J., 2007. *The Effects of the Classroom Flip on the Learning Environment: A Comparison of Learning Activity in a Traditional Classroom and a Flip Classroom that used an Intelligent Tutoring System*. (PhD dissertation)The Ohio State University.
- Talbert, R., 2011. Using MATLAB to Teach Problem-Solving Techniques to First-Year Liberal Arts Students. *MathWorks Newsletters*, In: <http://www.mathworks.com/company/newsletters/articles/using-matlab-to-teach-problem-solving-techniques-to-first-year-liberal-arts-students.html> (accessed October, 2012).
- Tullis, J.G., Benjamin, A.S., 2011. On the effectiveness of self-paced learning. *J. Mem. Lang.* 64, 109–118.
- Wyk, M.M., 2012. Measuring students' attitudes to economic education: a factorial analysis approach. *Soc. Sci. J.* 31, 27–42.
- Yamarik, S., 2007. Does cooperative learning improve student learning outcomes? *J. Econ. Educ.* 38 (3), 259–277.